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US030166

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# THE UNITED STATES OF AMERICA

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United States Patent and Trademark Office

June 16, 2004

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APPLICATION NUMBER: 60/477,200 ✓

FILING DATE: June 10, 2003 ✓

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60477200 17512 U.S. PTO

## PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2).

Docket Number

US030166

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inside this box ☐

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17512 U.S. PTO

60/477200

INVENTOR(s) / APPLICANT(s)

LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)
BIRRU	DAGNACHEW		BRIARCLIFF MANOR, NEW YORK

TITLE OF THE INVENTION (280 characters max)

8-VSB LIKE BACKWARDS-COMPATIBLE ROBUST STREAM MODULATION FOR ATSC  
DIGITAL TV

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STATE	New York	ZIP CODE	10591	COUNTRY	U.S.A.
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ENCLOSED APPLICATION PARTS (check all that apply)

<input checked="" type="checkbox"/> Specification	Number of Pages	<input type="text" value="2"/>	<input type="checkbox"/> Small Entity Statement
<input type="checkbox"/> Drawing(s)	Number of Sheets	<input type="text"/>	<input type="checkbox"/> Other (specify)

METHOD OF PAYMENT (check one)

<input type="checkbox"/> A check or money order is enclosed to cover the Provisional filing fees	PROVISIONAL FILING FEE AMOUNT (\$)	\$160.00
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees and credit Deposit Account Number: 14-1270		

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No

☐ Yes, the name of the U.S. Government agency and the Government contract number are:


Respectfully submitted,

SIGNATURE:  Date: 6/10/03

TYPED or PRINTED NAME: STEVEN R. BIREN

REGISTRATION NO.: 26,531

☐ Additional inventors are being named on separately numbered sheets attached hereto.

CERTIFICATE OF EXPRESS MAILING	
Express Mail Mailing Label No.	<u>EV 33581662</u>
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I hereby certify that this paper and/or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Alexandria, VA 22313.	
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Typed Name	Signature

## INVENTION DISCLOSURE (continued)

### 8-VSB like backwards-compatible robust stream modulation for ATSC digital TV transmission

There have recently been a growing interest to modify the ATSC digital TV standard in a backwards compatible manner such that broadcasters will be able to broadcast signal that has different degree of robustness together with the existing signal. The key to achieve robustness in a backwards compatible manner lies on the signal processing of the error correction part of the transmitter. A top level diagram of the mixing a robust stream with the standard stream is shown in figure 1.

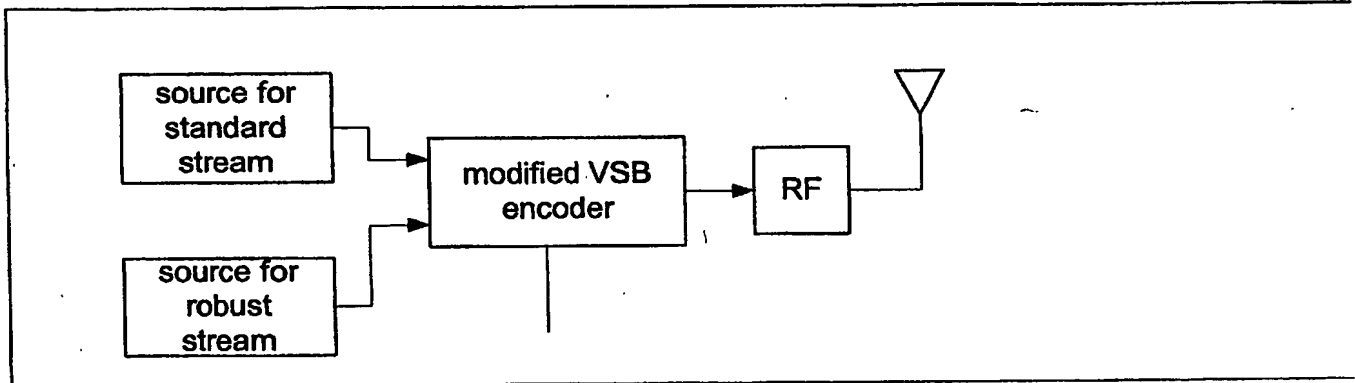


Figure 1: Top-level diagram of mixing a standard stream with a robust stream

The 8-VSB (ATSC) standard uses signals mapped to one of the 8-levels  $(-7, -5, -3, -1, 1, 3, 5, 7)$ . This is called equiprobable 8-VSB signal. One of the approaches to encode a robust stream is to reduce the alphabet size from 8 level to 4 level. For example, possibilities exist to use  $\{-7, -5, 5, 7\}$ , or  $\{-7, -1, 3, 5\}$ , or  $\{-5, -3, 1, 7\}$ , etc.

When the alphabet size is reduced from 8 to 4, then the performance of the system will improve. One of the disadvantages of such systems is that they can potentially have backwards compatibility problem. Old receivers that are designed based on the 8 level statistics may show some potential degradation. The alternative approach proposed here is to use multiple modulation types in a single stream in such a way that the statistics of the output signal will look like the standard 8-VSB signal. For example, if the set of constellation points  $\{-7, -1, 3, 5\}$ , or  $\{-5, -3, 1, 7\}$ , are randomly selected to modulate each symbol of the robust stream, the average signal will look like 8-VSB. Figure 2 shows the constellation diagrams.

## INVENTION DISCLOSURE (continued)

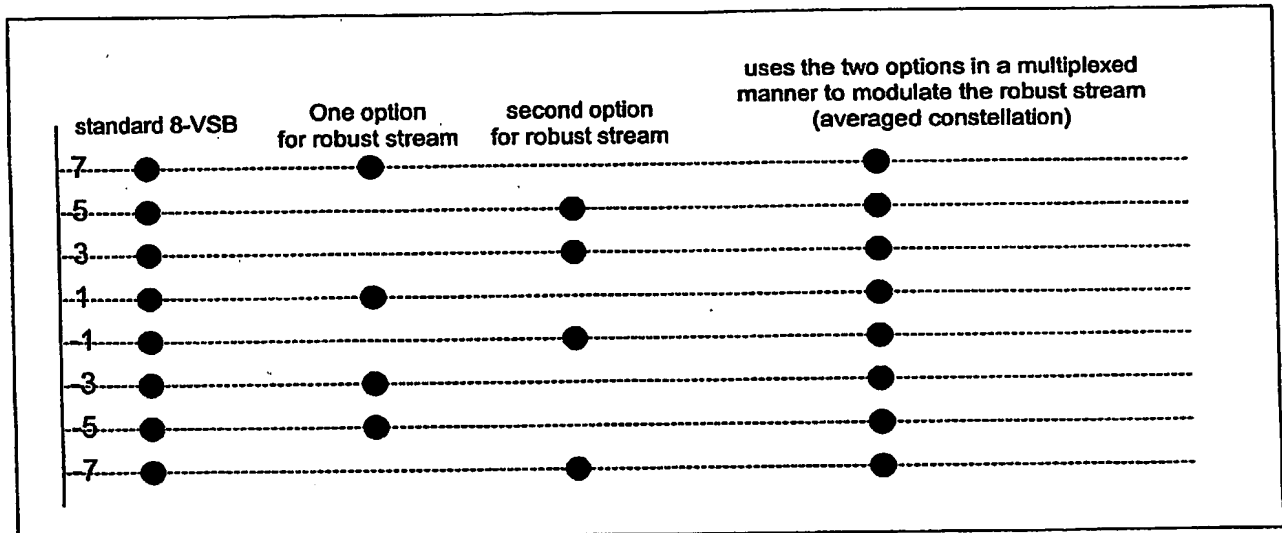


Figure 2: constellation diagrams

The constellations are achieved by manipulating the input of the trellis encoder of the standard 8-VSB system as shown in Fig 3. For a given robust stream symbol, the control sequence generator instructs the pre-processor to generate the appropriate bits such that when these bits are input to the standard trellis encoder, the output of this trellis encoder is forced to be one of the desired constellation points. For brevity reasons, the details of this operation are omitted since the exact implementation of the details can vary.

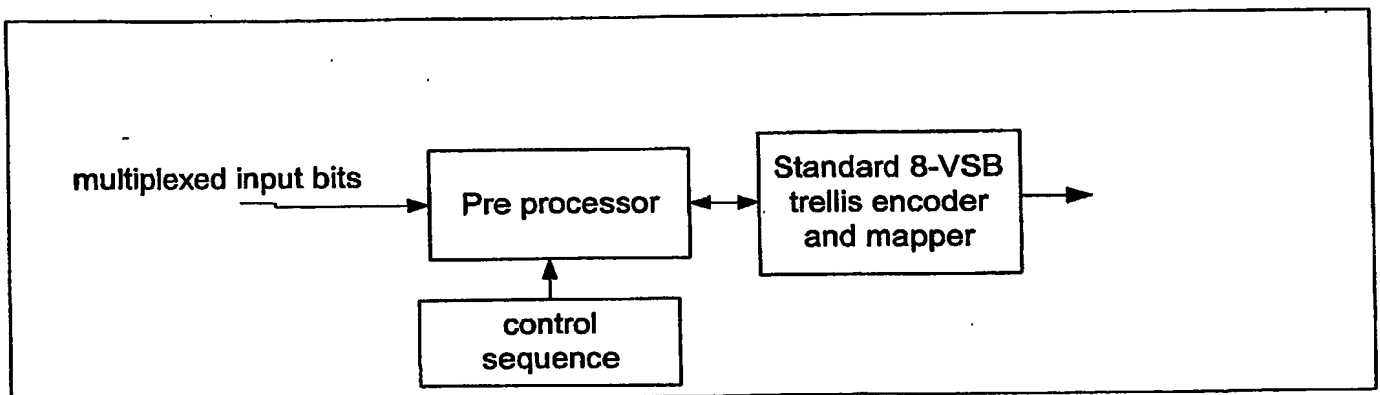


Figure 3: Simplified top-level diagram of the last stage of a modified ATSC VSB encoder

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

DAGNACHEW BIRRU

US 030

Serial No.

Filed: CONCURRENTLY

Title: 8-VSB LIKE BACKWARDS-COMPATIBLE ROBUST STREAM MODULATION FOR  
ATSC DIGITAL TVCommissioner for Patents  
Alexandria, VA 22313APPOINTMENT OF ASSOCIATES

Sir:

The undersigned Attorney of Record hereby revokes all prior appointments (if any) of Associate Attorney(s) or Agent(s) in the above-captioned case and appoints:

STEVEN R. BIREN

(Registration No. 26,531)

c/o PHILIPS ELECTRONICS NORTH AMERICA CORPORATION, Corporate Intellectual Property, 580 White Plains Road, Tarrytown, New York 10591, his Associate Attorney(s)/Agent(s) with all the usual powers to prosecute the above-identified application and any division or continuation thereof, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

ALL CORRESPONDENCE CONCERNING THIS APPLICATION AND THE LETTERS PATENT WHEN GRANTED SHOULD BE ADDRESSED TO THE UNDERSIGNED ATTORNEY OF RECORD.

Respectfully,

  
Michael E. Marion, Reg. No. 32,266  
Attorney of Record

Dated at Tarrytown, New York  
on June 9, 2003.